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ABSTRACT

The Worthington City School District, Worthington, Ohio, purchased, through Mind Surf software, a mathematics software program for two of their four middle schools. Each student was given a keyboard at the beginning of class. If the entered answer is correct, the student sees a green light on the keyboard. An incorrect answer lights a red light, and the student may not proceed until the green light is earned. Because the keyboards are numbered, the teacher can track the progress of each student. The school district hoped that this discourse technology would improve the student's scores on the Ohio mathematics proficiency test. Students in the discourse technology class are those identified as at-risk for failing the eighth grade mathematics proficiency test. Results for the past 5 years, for roughly 800 students each year, show that students who use the technology have benefited and the district's test scores have improved. The cost of the software is high, but student achievement has risen. (Author/SLD)

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Discourse Technology: An Evaluation Of Math Technology and Proficiency Scores for Worthington City Schools

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Jennifer Perkins and David A. Gilman

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I
Abstract

The Worthington City School District in Worthington, Ohio purchased a math software program for two of their four middle schools. The software was purchased through Mind Surf. Each student was given a keyboard at the beginning of class. The student has a number on their keyboard. The student enters their answers on the keyboard. If the answer is correct the student sees a green light on the keyboard, if they are incorrect they receive a red light. The student may not proceed until they get a green light. The number on the keyboards allows the math teacher to track each student's progress.

The district was hopeful that the discourse technology would improve their student's scores on the Ohio math proficiency test. The student's enrolled in the discourse technology class are identified as at-risk for failing the eighth grade math proficiency test. The results for the past five years have shown that students who use the technology have benefited and the districts test scores have improved.

Background of the Problem

When Ohio began standardized testing, the Worthington City School District wanted to ensure that their students had every opportunity to be successful. The district is one of the wealthier suburbs in Columbus. The median income for the area is $36,933 and the prices of homes range from $115,000 to $400,000. Eighty-nine percent of students who graduate from Worthington City Schools pursue some form of higher education (online, 2002). The pressure for the district to ensure academic success for their students is enormous.

The Worthington school district wanted to help students who were at-risk for failing the eighth grade math proficiency test. The first task the district faced was identifying the students that were at-risk for failure on the math proficiency test. According to a study conducted by Gaines and Davis (1990), teachers are poor indicators of students who are at-risk. Teachers when asked to identify at-risk students have a tendency to focus on problem and lower socioeconomic status students. They are not a reliable source for identifying those that may or may not pass a standardized test. The district needed to adopt new procedures that would identify the students that may fail the math portion of the proficiency test.

To identify the sixth grade students who were at-risk the district administered three achievement tests, as predictors of success on the proficiency test. The tests administered were the following; California Test of Basic Skills (CAT), Orleans Hannah Test of Algebra Readiness and Ohio sixth grade proficiency test. If the students failed any of the three tests, the students were identified as at-risk on the eighth grade proficiency test.

The majority of the problems identified by the achievement tests indicated long-term difficulties in basic mechanics and problem solving skills in math.

Once the district identified the problem areas and the at-risk students, they needed to decide on a method of intervention or remediation. While remediation efforts are well intended, they don't always succeed (National Association of Secondary Principals, 1988). In a study conducted by Sue Dangler (1994), thirty administrators were asked to rate twenty intervention and remediation strategies regarding test preparations for the Ohio proficiency tests. The study found that group tutoring was used most often; while the respondents felt individual tutoring would be a more effective strategy (Dangler, 1994). According to a Purkey and Strahan study (1986), when dealing with remediation one conclusion is clear; more of the same isn't better. A good remediation needs to effectively identify the problem areas and work to create a difference in the students' achievements. Worthington had identified the problem areas for its students but needed to find a successful remediation program.

The Worthington school district set out to find an alternative that would benefit students. The district chose to focus on new discourse technology that could assist their students. The technology is referred to as discourse technology, because it allows for a constant flow of communication between student and teacher. The teacher can monitor and communicate with the students using the technology at all times. *The Impact of Educational Technology and Student Achievement* found that 700 studies concluded that students who had access to educational technology showed positive gains in academic achievement (Schacter, 1995). The district searched for a discourse technology software to address their students math difficulties. The district chose to purchase software from

the Mind Surf Network. According to *Wiring the Classroom*, the magazine has concluded that the three R's have been expanded to include computers. School districts must recognize that the community demands the use of computers; they are not a frill (Holt, 1998).

The district chose the Mind Surf software because it tracks each student's work daily. Each student is given a keyboard with a corresponding number. The number is used to track the student on the teacher's computer. The student will solve a problem and hit the enter key. If the student is correct they get a "blinkie" or green light to continue. If the student is wrong they may not proceed until they get the "blinkie." If a student answers a problem incorrectly five times the number lights up on the teacher's screen. The teacher can then send a message to the student on their keyboard asking if they need assistance without embarrassing the student. The teacher's computer keeps track of all the times it took to get a correct answer and can identify each child's individual needs in math. When the individual needs are identified the child was then tutored one on one with a teacher's aid.

The software is expensive to purchase and maintain. The software to purchase cost the district $50,000. To keep the software technologically current costs $50,000 annually. Each school that utilizes this technology must pay $5,000 a year in a site fee and pay a teacher's aid salary of $20,000 a year. To ensure that the district receives results worth the cost, it has set-up their own experimental controls. The district separated its four middle schools into two groups; a control group of two middle schools that would not receive the software and an experimental group of two schools that would

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receive the technology software. If the software is successful then the district will see an improvement in their math proficiency test scores.

III
Statement of the Problem

The general question is how to improve general math understanding and proficiency testing. This investigation was to determine if the technology software provided a successful form of remediation for at-risk students on the math proficiency. To be classified as at-risk the student had to have failed any part of the three math achievement tests offered in the sixth grade.

Did the discourse technology improve the students' scores on the proficiency test? Compared to the two schools that didn't receive the discourse technology, was there a difference? Given the range of remedial arrangements reported by middle level schools, it is easy to see why middle schools are known as the most sensitive to learner needs (McEwin, et al., 1996). Did the discourse technology meet the needs of the students involved in the remediation program?

The hypothesis for this study was: There is a significant difference in proficiency scores between the two middle schools that received the technology and the two middle schools that did not.

IV
Methodology

The subjects who participated in this study were all the eighth grade students enrolled in the Worthington City School district in Worthington, Ohio for the past five years.

Students were unaware of their involvement in any study. The students either received or didn't receive the technology due to their enrollment in a school, that was or wasn't participating in discourse technology.

McCord and Perry Middle Schools were chosen to receive the discourse technology. Worthingway and Kilbourne Middle Schools were chosen not to receive the technology. The school district offered all the same achievement tests to all the sixth graders, to identify the at-risk students. The at-risk students at McCord and Perry were enrolled in a special math program that offered the remediation discourse technology. After the software tracked their results, the student was then given one-on-one tutoring with a teacher's aide. The other two middle schools did not offer the remediation math class.

The district, for the next five years, tracked the results of the eighth grade proficiency test between the four buildings. The district compared the test results between the two schools that didn't receive the discourse technology (the control group) and the two schools that did receive the discourse technology (the experimental group).

V
Results

The results for the past five years have shown a significant difference between students that have received the technology and those that have not. The students that have received the technology have performed better on the proficiency test.

For the past five years, the schools that have received the technology and used it for at-risk students, has had a 98% pass rate on the test. The schools without the technology have a 90% pass rate for their at-risk students.

Figure 1 shows the overall performance of all eighth graders in the Worthington school district that took the math proficiency test. The graph shows the number of students that took the test and the number of students that passed the test.

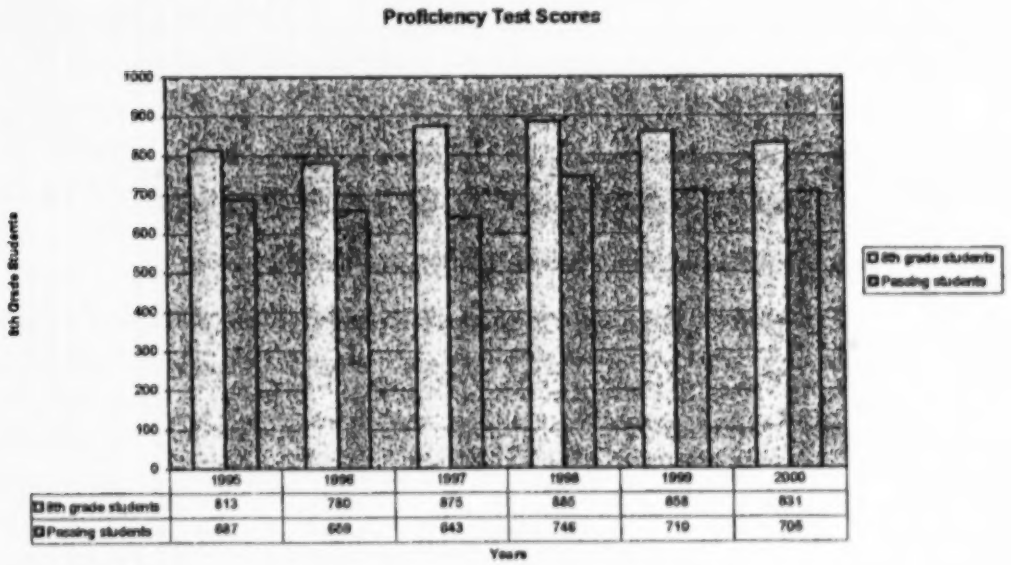

Figure 2 shows the overall performance for all of Worthington's eight graders for the past five years. After 2000, the Ohio Department of Education will no longer report eighth grade test scores because the proficiency test is being moved to the tenth grade.

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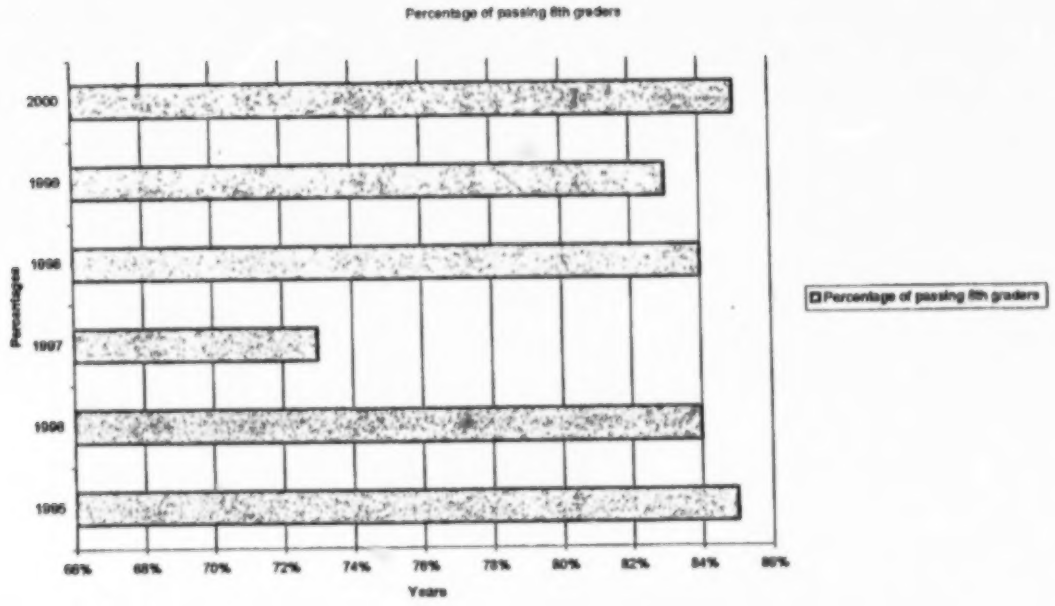

VI
Discussions, Conclusions, and Recommendations

Results of this study provide evidence that Worthington has improved math proficiency scores in the two middle schools, with the use of the discourse technology. Neither school with the technology has had a student receive below a 60% on the math test for the past five years. Essentially, the district is paying for an eight percent better pass rate with the use of the technology.

Given the tremendous cost to buy and update the technology, if the district has financial concerns the expense will be hard to justify to taxpayers. The average salary for a teacher in the district is $57,000 a year. The technology costs the district $50,000 annually, which could easily be seen as a frill. Parents want the best scores, but they may not be willing to pay the expense.

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This program is successful, but is it fair that a wealthier district has access to technology, that creates such an advantage? Columbus Public City Schools could never afford to buy or provide these advantages for their students. High-poverty schools have a smaller percentage of instructional rooms connected to the Internet than more affluent schools (Gale Group, 2001). Is it fair that more affluent schools can provide their students with a better chance at success on the proficiency test, due to expensive discourse technology? In a world where success is passing the proficiency test, this seems an unfair advantage.

Due to recent changes made by the Ohio Department of Education, the proficiency test will no longer be offered at the eighth grade. All proficiency tests for graduation will be moved to the tenth grade. The move to the tenth grade cuts down on the number of times a student can take the test to pass for graduation. With the move to the tenth grade the test will also be changed to writing intensive. All answers must be written, similar to the ISTEP that is used in Indiana. With the move, the use of the technology at the eighth grade has already come into question. First will it be useful in teaching long-term math skills? Second will it help in passing the new tenth grade proficiency test?

The technology is with improving test scores, but it may be that more factors have attributed to better scores than just technology. Is it the individual tutoring with the teacher's aide that creates success on the test? Does a class size of eighteen help academic achievement? Or could it be a combination of technology and individual attention that creates success on the test? Whatever the combination, it seems to have worked for the Worthington City School district for the past five years.

Regardless of the future of the technology, it has helped improve test scores. Therefore, the technology has done its job. It has provided an alternative to drill and skill remediation or pullout programs, which are not as successful. With each student that passed due to the technology, the district produced better test scores. Ultimately the district has met its goal and the community's goals to create successful learners.

VII
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